



Estimation and characterization of children's ambient generated exposure to PM_{2.5} using sulphate and elemental carbon as tracers

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Abstract:

Children's exposures to ambient and non-ambient fine particulate matter (PM_{2.5}) were determined using the sulphate and elemental carbon components of the PM_{2.5} mixture as tracers of the ambient contribution during a 6-week winter period in Prince George, British Columbia, Canada. Personal exposures to PM_{2.5} were measured in children at 5 elementary schools located throughout the city and ambient samples were collected on school rooftops. Average ambient levels and personal exposures during this time period were 13.8µgm⁻³ and 16.4µgm⁻³ respectively. From the data pooled across individuals, use of the two different tracers indicated identical estimates of median exposure to ambient PM_{2.5} (7.5µgm⁻³) and similar estimates of non-ambient generated exposure (6.4 and 5.0µgm⁻³) and infiltration (0.49 and 0.52) for the sulphate and elemental carbon approach, respectively. The median fraction of the ambient concentration resulting in exposure or exposure factors were 0.54 and 0.55 respectively, however lower values of 0.46 and 0.42 were determined from regression analysis. A strong association was found between exposure to ambient PM_{2.5} and measured ambient concentrations at both the closest school monitor (median rEuro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin)0.92) and a central site (median rEuro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin)0.88) demonstrating that the central site monitor was suitable for assessing longitudinal ambient generated exposure throughout the city. These results support the use of elemental carbon as a tracer of ambient generated exposure and the use of ambient data as estimates of longitudinal changes in children's exposure in this setting. The importance of both ambient and non-ambient sources of PM_{2.5} is emphasized by their almost equal contribution to total personal exposures. Comparison with other studies suggests a limited influence of climate and the cold season in Prince George on exposure levels and found similar mean non-ambient generated exposures despite large variability across and within subjects in any given location. © 2010 Elsevier Ltd.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution

Air Pollution: Particulate Matter

Geographic Feature:

Climate Change and Human Health Literature Portal



resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Non-U.S. North America

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Population of Concern: A focus of content

Population of Concern:

populations at particular risk or vulnerability to climate change impacts

Children

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content